Ames Procedural Requirements

APR 8739.10
Effective Date: April 11, 2023
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COMPLIANCE IS MANDATORY

Subject: Ames Electrical, Electronic, and Electromechanical (EEE) Parts Control Requirements

Responsible Office: Code D / Office of the Chief Engineer

CHANGE LOG

Status [Baseline /Revision /Cancelled]	Document Revision	Date of Change	Description
Baseline		June 2009	Initial
Revision	2	3/13/2018	Updated document to utilize agency EEE part database, EPARTS, and Agency Consolidated EEE Parts Capabilities
Revision	3	4/11/2023	Change document number from 8730.2 to 8739.10; change references from NPD 8730.2 to NASA-STD-8739.10; format per NPR 1400.1. Some minor changes to further clarify applicability and technical terms.

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PREFACE

P.1 PURPOSE

a. Every Electrical, Electronic, and Electromechanical (EEE) part intended for use in spaceflight is reviewed and approved for compatibility with the intended space environment and mission life. This document defines the baseline EEE parts selection, management, and control for spaceflight hardware and instrument for all Ames Research Center (ARC)-led missions. For missions managed outside of ARC, EEE parts control will be in accordance with Project direction.

b. The EEE part type categories covered by this document are listed in Table P-1. In addition to these part types, Commercial Off-The-Shelf (COTS) assemblies and sub-assemblies containing EEE parts shall be treated as to be within the scope of this APR.

c. This document also provides guidelines and requirements for counterfeit EEE parts prevention and control at ARC.

Table P-1. EEE part type categories.

Part Type	Federal Source Code
Capacitors	5910
Connectors and Contacts	5935
Crystals	5955
Crystal Oscillators	5955
Fiber Optics, Passive	60GP
Filters	5915
Fuses	5920
Heaters	4520
Inductors	5950
Magnetics	5950
Microcircuits, Hybrid	5962
Microcircuits, Monolithic	5962
Microcircuits, Plastic Encapsulated (PEMs)	5962
Relays, Electromagnetic	5945
Resistors	5905
Semiconductor Devices, Discrete	5961
Switches	5930
Thermistors	5905
Wire and Cable	6145

P.2 APPLICABILITY

a. This directive is applicable to ARC and associated facilities, e.g., contractor's facilities, etc.

b. This directive applies to contractors, grant recipients, or parties to agreements only to the extent specified or referenced in the appropriate contracts, grants, or agreements.

c. In this directive, all mandatory actions (i.e., requirements) are denoted by statements containing the term "shall." The terms "may" or "can" denote discretionary privilege or permission, "should" denotes a good practice and is recommended, but not required, "will" denotes an expected outcome, and "are/is" denotes descriptive material.

d. In this directive, all document citations are assumed to be the latest version unless otherwise noted.

e. This directive applies to spaceflight hardware systems, including both spacecraft and science instruments, that are designed and built at ARC or procured through ARC contractors or grantees.

f. For Class A and B payloads, GSFC EEE-INST-002 applies.

g. For missions managed outside of ARC, EEE parts control is in accordance with Project direction.

h. Tailoring: For small spaceflight projects, defined as those with a life-cycle cost (LCC) of $25M or less, the Project should review the requirements of this document and develop a tailoring approach. The tailoring approach, based on an acceptable risk profile for the project, should define which requirements are applicable as stated, which are not applicable, and those for which an alternate approach is being requested. It is envisioned that this is a one-time process that occurs very early in the project development life-cycle and requires approval by the ARC Parts Control Board (PCB). Additional tailoring, deviation, or waiver beyond the initial tailoring can occur if required by the Project.

P.3 AUTHORITY

a. NASA-STD-8739.10, Electrical, Electronic, and Electromechanical (EEE) Parts Assurance Standard.

P.4 APPLICABLE DOCUMENTS AND FORMS

a. NPR 8705.4, Risk Classification for NASA Payloads

b. GSFC EEE-INST-002, Instructions for EEE Parts Selection, Screening, Qualification, and Derating

c. NASA Parts Selection List (NPSL)[1]

P.5 MEASUREMENT/VERIFICATION

a. Verification of conformance to requirements in this directive are measured through Center and Responsible Organizational management reviews, self-assessments, and subsequent analysis and reports of conformance to requirements, as well as periodic internal audits.

b. Compliance with the requirements contained within this APR will be measured as part of project life cycle milestone reviews and the CoFR assessment.

[1] NPSL: https://nepp.nasa.gov/nepag/info/parts_assurance_level.htm

P.6 CANCELLATION

a. APR 8730.2, Ames EEE Parts Control Requirements, dated March 12, 2018.

Eugene Tu
Director

DISTRIBUTION STATEMENT:

Internal and external distribution.

CHAPTER 1 ROLES AND RESPONSIBILITIES

1.1 The Ames Chief Engineer (ACE) shall develop EEE parts control requirements.

1.2 The Safety and Mission Assurance (S&MA) Chief shall:

a. Ensure that projects follow the policies and requirements established in this document. Verification methods include auditing, conducting or attending project reviews to ensure that proper procedures are in place and carried out.

b. Report counterfeit parts to NASA Office of Inspector General (OIG) and Director of Acquisition Integrity Program (AIP).

c. Assign SMA representatives to ARC spaceflight projects, to monitor the execution of the Project EEE Parts Control Plans (PCPs) to ensure compliance to this document.

1.3 The Parts Control Board (PCB) at ARC consists of the EEE parts Lead Discipline Engineer (LDE), the S&MA Chief and the ACE. The ACE chairs the PCB and convenes the Board when requested by the Project to review and approve the Project EEE PCP or to review and grant waivers for non-standard parts. The PCB shall:

a. Review and approve Project EEE PCPs (including tailoring).

b. Review and approve all non-standard EEE parts waiver requests.

c. Make determinations on EEE parts policy-related issues at ARC.

1.4 The Program/Project Manager (PM) for each ARC project determines and documents the mission needs, in terms of reliability of the spaceflight hardware and instruments. These requirements in turn determine the EEE parts assurance level needed for the project, and the PM has the overall responsibility to assure that proper parts are selected to meet the needs. The PM shall:

a. Ensure a complete Project EEE PCP is developed by the project Preliminary Design Review (PDR) date.

b. Assess system level trades, decision making, risks, and processes against the requirements in this document.

c. Flow down applicable requirements of this APR in contracts to ARC contractors, sub-contractors and grantees.

d. Approve Purchase Order (PO) and Statement of Work (SOW) for project EEE parts.

e. Ensure that the Project EEE PCP is executed per the requirements of this APR.

f. Provide flight history and performance data of any non-standard EEE (PCB-approved) parts on the project to the EEE Parts LDE.

1.5 The Project Parts Engineer (PPE) is assigned by the PM for each ARC spaceflight project to handle all EEE parts management tasks. The PPE role does not have to be a full-time dedicated position (e.g., it can be performed as an additional role of the lead avionics designer). The PPE, however, must have sufficient knowledge in EEE parts so that an accurate assessment of parts types and grades needed for the spaceflight hardware and science instruments on the project can be made with the assistance of the EEE parts LDE. The PPE shall:

a. Develop a Project EEE PCP per the requirements in this APR.

b. Identify and submitting non-standard EEE parts waiver requests to PCB for approval prior to procuring spaceflight parts.

c. Run NASA Advisory and GIDEP alert searches for all EEE parts intended for project use and repeat the searches before procurement starts.

d. Ensure no unapproved parts get used in the project.

e. Ensure parts availability for repair and new builds throughout the operational life of the project.

f. Generate and maintain a Project Parts List (PPL) for tracking purposes.

1.6 The EEE Parts Lead Discipline Engineer (LDE) works under the direction of the ACE and is the ARC representative for the NASA Electronic Parts Assurance Group (NEPAG), which shares EEE parts knowledge and failure experiences among government agencies, space electronics industry, and international space agency partners. The EEE parts LDE shall:

a. Serve as the EEE parts technical expert at ARC.

b. Serve as a technical consultant to PPE's by reviewing Project EEE PCPs and making recommendations.

c. Provide EEE parts technical expert concurrence, as a PCB member, on requests for non-standard parts waivers.

d. Coordinate in advance with the agency EEE Parts Manager when testing is needed on new EEE parts in accordance with the NASA EEE Parts Capabilities Consolidation strategy.

> *Note: This allows ARC projects access to the Agency EEE parts expertise and facilities efficiently in cost and time.*

e. Review EEE parts documentations, analyses and reports submitted by suppliers and contractors to verify authenticity and conformance (or equivalency) to this APR.

f. Notify SMA Chief of suspected counterfeit parts.

g. Upload approved non-standard EEE parts to the NASA agency EEE part database, EPARTS (https://eparts.nasa.gov), for recording keeping for the Center.

1.7 The Project Chief S&MA Officer (CSO) or an SMA designee, who represents the SMA Chief, shall:

a. Verify that effective processes and controls for EEE parts management are in place for the project.

b. Verify that Project EEE PCP is being properly followed and executed at every stage, i.e., every process step has been followed according to the plan.

c. Verify that parts control requirements are included in the project parts POs and SOWs.

d. Verify that vendors'/contractors' documentations on their EEE Parts Control Programs and certificates of conformance have been submitted to the project when spaceflight hardware or instruments are procured externally.

1.8 Responsibilities Summary

The responsibilities delineated above are summarized in Table 1.

Table 1. ARC EEE Parts Control Program: Roles and Responsibilities.

	Formulation	Approval	Implementation
ACE			- Chairs the PCB and convenes the Board
PCB		- Review ARC Project EEE PCPs - Approve EEE parts waivers - EEE parts control ruling body	
LDE	- ARC EEE parts technical expert - Project EEE PCP consultant to PPE - ARC NEPAG representative	- EEE parts technical concurrence	- EEE parts documents reviewer - Notify SMA Chief of suspected counterfeit parts - Upload approved non-standard EEE parts onto EPARTS
PPE	- Develop Project EEE PCP - Ensure parts availability - Manage Project Parts List	- Submit Project EEE PCP for PCB approval - Submit parts waiver requests	- Search NASA/GIDEP alerts - Collect parts flight history data
S&MA Rep.			- Verify all Project EEE PCP steps executed - Verify APR reqs. are in PO/SOW - Review PCPs from ext. sources
PM	- Ensure Project EEE PCP created by PDR - Flow down reqs. to contractors - Assess system trades vs. APR reqs.		- Approve parts PO/SOW - Ensure Project EEE PCP properly completed - Send SMA Chief parts flight data
S&MA Chief		- S&MA concurrence on PCB	- Assign SMA reps. to projects - Report counterfeits to OIG

CHAPTER 2 PROCESS

2.1 Operation of EEE Parts Control Program

2.1.1 The operation of the EEE Parts Control Program at ARC involves the Ames Chief Engineer, the System Safety and Mission Assurance Office, and the Program/Project Office. The execution of the ARC project Parts Control Program is the responsibility of the Project Manager, with oversight responsibility from the S&MA Chief, ACE, and EEE Parts LDE. ARC Program/Project space hardware contractors and subcontractors shall implement this APR and, where appropriate, can tailor the parts control process to specific organization's practices as long as it meets all of the purposes (P.1) stated in this document.

2.1.2 The EEE Parts Control Program at ARC applies to class C and D payloads as defined by NPR 8705.4 and EEE parts requirements are specified in Table 2-1.

2.1.3 Class A and B payloads shall comply with GSFC EEE-INST-002 and ARC EEE parts requirements for classes A and B payloads are stated in NPR 8705.4, Appendix B.

Table 2-1. ARC EEE Parts Requirements by Payload Class.

ARC EEE Parts Selection Requirements			
Class A	Class B	Class C	Class D
NPSL Level 1, Level 1 equivalent Source Control Drawings* (SCDs)	Class A requirements or NPSL Level 2, Level 2 equivalent SCDs	Class A, Class B or NPSL Level 3, high-quality COTS parts	Class A, Class B, Class C, or quality COTS parts

Note 1: These requirements are the same as stated in NPR 8705.4, Appendix D except that quality COTS parts are also permitted for Class D payloads.

*Note 2: *Source Control Drawings: When parts cannot be procured to the 3 levels, a document (SCD) is prepared by the supplier to control procurement requirements to the equivalent level, which include screening and qualification, performance parameters, absolute maximum ratings, dimensions, terminal descriptions, materials, and other unique requirements.*

Note 3: NASA Parts Selection List (NPSL) levels 1, 2, and 3 complete descriptions can be found at: http://nepp.nasa.gov/nepag/info/parts_assurance_level.htm, and are summarized as:

- *Level 1: Parts are inherently low risk.*
- *Level 2: Parts have inherently higher risk than level 1 and are considered moderate risk.*
- *Level 3: Parts are inherently high risk because there is little dependable data or history available for them and changes in their materials, designs and processes may occur continuously without notification.*

2.1.4 Commercial-Off-the-Shelf: When COTS parts are intended to be used, the PCB shall review their functions and reliability against mission requirements before approval can be granted to ARC projects through the non-standard EEE parts waiver request process. COTS parts are very attractive in terms of unit cost and availability and may be even better in quality and reliability than traditional space level parts, due to orders of magnitude higher production volume and successful high-volume usage in a wide array of applications. In addition, due to ample availability and low cost, the counterfeit risk in COTS parts is minimal.

2.1.5 The differences in processing steps for the three levels of EEE parts and COTS are shown in Table 2-2, as a reference. Level 3 and COTS parts are very similar in quality and are the minimum EEE part grades required for class C and D payloads; Level 1 and Level 2 can be selected if they are available and not cost prohibitive to ARC projects.

Table 2-2. Differences in processing steps* for the NPSL parts levels.

Wafer Fabrication	**Level 1**	**Level 2**	**Level 3**	**COTS**
Agency Certification (Plant & Operators)	Yes	Yes	No	No
Baselined Process Flow	Yes	Yes	No	No
Traceability of Baseline Changes	Yes	Yes	No	No
Number of Wafer Runs in lot	1	Not Controlled	Not Controlled	Not Controlled
Wafer Lot Acceptance	Yes	No	No	No
Wafer Rework Control	Yes	Yes	Not controlled	No
Wafer Bonusing Controlled	Yes	No	No	No
Assembly	**Level 1**	**Level 2**	**Level 3**	**COTS**
Agency Certification (Plant & Operators)	Yes	Yes	No	No
Internal Visual Inspection	Yes	Yes	Yes	Yes
Tightened Lot Control	1	N/A	N/A	N/A
Destructive Die Shear Monitor	2 hours	4 hours	No	No
Destructive Bond Pull Monitor	2 hours	4 hours	No	No
Non-Destructive Bond Pull	Yes	No	No	No
Screening	**Level 1**	**Level 2**	**Level 3**	**COTS**
Agency Certification (Plant & Operators)	Yes	Yes	No	No
Electrical Subgroup 1-12 Tested	Yes	No	No	No
Extended Burn-In (Dynamic, 240 hrs)	Yes	No	No	No
100% PIND Test	Yes	No	No	No

PDA	5%	10%	Some	No
Attributes Data	Yes	Yes	Yes	Yes
Variable Data (Read/Record)	Yes	No	No	No
Failure Analysis Requirements	Yes	No	No	No
Qualification	**Level 1**	**Level 2**	**Level 3**	**COTS**
Agency Certification (Plant & Operators)	Yes	Yes	No	No
Frequency of 1000 hour Life test	Yes (every lot)	12 months	12 months	Not Specified
Frequency of Package Qualification	6 months	12 months	12 months	Not Specified

*Note: *More information about processing steps can be found at the NEPAG website: http://nepp.nasa.gov/nepag/info/diff_menu.htm*

2.1.6 The NASA Parts Selection List and the expertise of NEPAG should be leveraged by ARC projects to meet the requirements of this APR and to minimize costs associated with selecting and qualifying EEE parts for use. In addition, the NASA agency EEE part database, EPARTS, can be used as a key resource to search for part information as well. Finally, the EEE LDE, on behalf of the projects, may coordinate with the agency EEE Parts Manager for selection and qualification of problematic EEE parts.

2.1.7 Each project's PPE shall generate a Project Parts List (PPL) for tracking potential parts availability, application issues and stress, keep the parts list current, and have it reviewed for risk assessment prior to build and periodically throughout the development process, e.g., checking for NASA advisories, GIDEP alerts, source of supply and counterfeit alerts.

2.1.8 Parts Selection and Derating

2.1.8.1 EEE parts selection for critical flight hardware should consider, as appropriate per the space mission environment, the following:

a. EEE parts susceptible to Single Event Effect (SEE) caused by high-energy ionized particle radiation should be avoided or minimized.

b. Microcircuits should be evaluated for Single Event Latch-up (SEL) and Single Event Upset (SEU) susceptibility.

c. Power bipolar transistors and diodes should be evaluated for Single Event Burnout (SEB).

d. Linear bipolar integrated circuits should be evaluated for Enhanced Low Dose Rate Sensitivity (ELDRS) effects.

e. Power Hexagonal Field Effect Transistors (HEXFET) should be evaluated for Single Event Gate Rupture (SEGR).

f. Capacitors and transistor gate oxides should be evaluated for Single Event Dielectric Rupture (SEDR).

g. Circuit designs containing SEE sensitive electronic parts should be analyzed to minimize the effect of SEE and to assure compliance with component level requirements.

2.1.8.2 Derating is the reduction of electrical and thermal stresses applied to a part during normal operation in order to decrease the degradation rate and prolong its expected life. The GSFC EEE-INST-002 document can be used as a guideline for derating EEE parts, especially passive components such as capacitors, resistors, inductors, wires, cables, and connectors; however, these guidelines may be too stringent for class C and D spacecraft projects so some adjustments may be made by a designer. Derating microcircuits is more complex. A strict scaling of supply voltage, output current, power dissipation, operating frequency, and temperature (for instance, to 80% of the maximum rating), may render the device non-functional. Hence, a designer should closely review the device datasheet to find out what amount of derating is appropriate for each parameter.

2.1.9 Parts Control Board

2.1.9.1 A review board, the Parts Control Board, serves the EEE parts quality control function for the Center. The PCB consists of the ACE, the EEE parts LDE, and the S&MA Chief, with the ACE serving as the chair. The PCB will meet on an as-needed basis to review project EEE parts control plans and evaluate non-standard parts waiver requests. Every non-standard part intended to be used on an ARC spaceflight project shall be reviewed and approved by the PCB. The PCB is the ruling body and decision maker for all EEE parts policy related issues at ARC.

2.1.10 Project EEE Parts Control Plan

2.1.10.1 The Project Parts Engineer is responsible for developing and managing the Project EEE PCP on each ARC spaceflight project. The requirements of the plan shall be established to obtain the appropriate level (1, 2, or 3), or equivalent, of EEE parts for the mission classification according to Table 2-1.

2.1.10.2 The Project EEE PCP shall:

a. Control EEE parts activities from the design and development phase though use and maintenance of the hardware systems and instruments.

b. Document the requirements for part selection, quality assurance, parts application criteria, parts configuration control, lifetime availability of parts, assembly, and handling considerations.

c. Be reviewed and approved by the PCB prior to spaceflight parts procurement.

2.1.10.3 The plan may either be a separate document or part of one of the approved Project plans.

2.1.10.4 The EEE parts LDE will be available to provide consultancy in generating the project PCP. A project checklist for EEE parts management on ARC projects will be provided by the EEE parts LDE to the PPE.

2.1.11 Non-Standard Parts Approval

2.1.11.1 EEE parts not meeting the minimum quality and reliability criteria of standard parts in Table 2-1, for the corresponding class of payload, are defined as non-standard parts. This include COTS parts that are not widely used in commercial applications, have not been used in other ARC or NASA spaceflight applications, or have not been approved by the PCB.

2.1.11.2 Every non-standard part must be pre-approved for use on a spaceflight project by the ARC EEE Parts LDE.

2.1.11.3 The supporting data to accompany the request form shall include:

a. Screening specification.

b. Reliability data.

c. Any other relevant technical information that may demonstrate suitability of the parts for the intended project applications.

2.2 Parts Acquisition

2.2.1 Parts Procurement

2.2.1.1 Levels 1 and 2 EEE parts for flight hardware and instruments shall be procured directly from original parts manufacturers or their authorized distributors when traceability to the manufacturer can be established.

2.2.1.2 Level 3 and COTS parts shall be procured from original parts manufacturers or their authorized distributors where Certificate of Conformance (C of C) can be obtained.

2.2.1.3 Purchase orders or purchase requisitions shall not contain exceptions to referenced specifications or requirements unless pre-approved by the Project Manager or the EEE parts LDE.

2.2.1.4 Suppliers of ARC class C and D flight hardware with EEE parts shall provide:

a. The Project Parts Engineer with a Parts Control Program plan describing their implementation of the requirements, or equivalents, specified in this document.

b. Evidence(s), upon request by the Project, to verify that the in-house parts control requirements have been executed fully during the production of the purchased flight hardware unit(s).

2.2.1.5 All Level 1, 2, 3 and COTS EEE parts shall be subjected to screening either at the supplier or by the project. Part screening should be performed either at the part or board/subsystem level to remove defective parts by the project.

2.2.1.6 Level 1 and 2 EEE parts screening shall consist of testing of 100% of the parts to the corresponding assurance level requirements.

2.2.1.7 The PPE shall plan for adequate EEE parts procurement lead times in support of the manufacturing and delivery schedules.

2.2.2 Traceability

All flight EEE parts purchased shall be traceable to a specific manufacturer, part number, and lot number or lot trace code. In addition, parts requiring serial numbers should have traceability to test data associated with the same lot or individual parts.

2.2.3 Receiving

After receiving EEE parts shipments, the person(s) in charge of project procurement shall check and verify the accuracy of the shipments (for instance, visually inspecting the parts to make sure the part numbers, Lot Date Code (LDC), pin count and package type match those on the purchase orders).

2.2.4 Handling and Storage

2.2.4.1 The EEE parts shall be handled with proper ESD (Electrostatic Discharge) care and then be stored in a bonded storage under configuration management.

2.2.4.2 The Project Parts Engineer will check parts out of the bonded storage and visually inspect them for obvious damages or defects before putting them in BOM (Bill of Materials) kits for circuit board assembly work. If damages, defects, or non-conformance to part specifications are found, the PPE should follow the procedure stated in APR 8735.1 for proper disposition of the parts.

2.3 Record Keeping of Approved Non-Standard EEE Parts

The NASA agency EEE part database, EPARTS, will be utilized as an online tool to keep track of the PCB approved non-standard EEE parts at ARC. The flight data and performance history of these parts, furnished by Project Managers whenever they become available, can be uploaded onto EPARTS as part of the maintenance task. This way, EPARTS will not only serve as a record-keeping tool for ARC flight EEE parts, but it will also provide implementation data that indicates whether the non-standard EEE parts approval process is successful. It will also add to the list of EEE parts with successful flight heritage that can be selected by future projects, which will reduce mission risks and costs. Furthermore, this information will be available to other NASA Centers on EPARTS so it can also benefit the agency as a whole.

2.4 Counterfeit EEE Parts Control Plan

2.4.1 Counterfeit EEE parts mitigation plan starts with design and selection of parts. Avionics designers should proactively manage project lifecycle vs. parts lifecycles (i.e., check for future availability before selecting a part and update designs when parts become hard to find or unavailable).

2.4.2 The PPE shall check the source-of-supply through GIDEP database searches for parts intended for use to make sure that none of the parts is on the discontinued or to-be-discontinued lists. If a part happens to be on either list, one mitigation plan is to contemplate a lifetime buy. Another approach is to look for an alternative part that does not have a supply constraint during the operational life of the project. As a last resort, a system redesign may be investigated.

2.4.3 As part of the project support effort, the EEE parts LDE will provide assistance to the PPE in the source-of-supply and GIDEP counterfeit parts searches against the PPL supplied by the PPE to mitigate risks. Other key steps to take in order to mitigate counterfeit EEE parts problem are described below.

2.4.4 **Purchasing** - Only buy directly from manufacturers or their authorized distributors, require proof of traceability to original manufacturer, verify manufacturers have guaranteed methods to destroy scrapped parts, and buy adequate stock of lifetime buys. Purchasing from independent distributors should be avoided, and when it is unavoidable due to discontinued productions, request the original part manufacturer to authenticate documentations received from the distributor.

2.4.5 **Contract** - Coordinate with the Contracting Officer to include applicable quality requirements in contracts that hold suppliers liable for counterfeit parts and specify contractor flow down of applicable counterfeit parts prevention requirements to their subcontractors.

2.4.6 **Receiving** - All parts shall be subjected to receiving inspection by the Project to verify compliance with the controlling specifications. Receiving personnel should visually inspect parts, pay attention to labels, misspelling, omissions, and ensure lot date codes matching that on labels. The PPE

should secure package and die photographs from original manufacturers for EEE parts purchased from independent distributors to help identify counterfeits.

2.4.7 **Testing** - Parts testing shall be defined in the procurement requirements as specified by the project. Destructive Physical Analysis (DPA) is not required, though it is advisable if parts are involved in mission critical functions and are purchased from independent distributors.

2.4.8 **Control** - Identify and quarantine suspect counterfeit parts, followed by confirmation whether the parts are authentic or counterfeit. Once a part is confirmed counterfeit, all potential counterfeit units shall be on hold in storage and identify installed counterfeit units pending disposition by appropriate authorities. Destroy and/or submit to investigation authorities confirmed counterfeit parts. Counterfeit parts should only be returned to suppliers under controlled conditions so as to prevent their re-entry into the supply chain.

2.4.9 **Training** - Anti-counterfeit education and training programs for internal and external stakeholders at ARC shall be coordinated and provided by the S&MA Chief. The training should be relevant, up-to-date, thorough, and offered as need arises since new counterfeiting tactics are discovered on regular basis.

2.4.10 **Reporting** - The SMA Chief shall report suspected counterfeit parts to the NASA Office of Inspector General and the NASA Director, Acquisition Integrity Program.

2.5 Records

2.5.1 The following records shall be maintained:

Table 2-3. Records

Record	Retained By	Minimum Retention
Project PCP	Project Manager	End of Project life-cycle
Non-standard parts waiver approvals	Project Manager	End of Project life-cycle
Project Parts List	Project Manager	End of Project life-cycle
PCB-approved non-standard parts flight performance data	Project Manager	End of Project life-cycle + 1 year

APPENDIX A. ACRONYMS

ACE	Ames Chief Engineer
APR	Ames Procedural Requirement
ARC	Ames Research Center
COTS	Commercial-Off-The-Shelf
CSO	Chief SMA Officer
EEE	Electrical, Electronic, and Electromechanical
GIDEP	Government-Industry Data Exchange Program
GSFC	Goddard Space Flight Center
LDE	Lead Discipline Engineer
NEPAG	NASA Electronic Parts Assurance Group
NPR	NASA Procedural Requirement
NPSL	NASA Parts Selection List
PCB	Parts Control Board
PCP	Parts Control Plan
PDR	Preliminary Design Review
PM	Program/Project Manager
PO	Purchase Order
PPE	Project Parts Engineer
PPL	Project Parts List
SCD	Source Control Drawing
SEE	Single Event Effect
S&MA	Safety and Mission Assurance